



CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 :2005



Job No.: CTCE/BBMP/W.No.11/NK/CSR-11/993r/CEMENT/2015-16

Date: 16.11.2015

TEST REPORT ON CEMENT

* CUSTOMER	:	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
*AGENCY	:	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore - 64.
*NAME OF THE WORK	:	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.
*REFERENCE	:	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
SAMPLE ID	:	Cement
SAMPLE RECEIVED ON	:	14.11.2015
PERIOD OF TESTING	:	14.11.2015 to 16.11.2015



The results of the tests conducted on the cement sample are as follows:

Sl. No	Descriptions	Test Method as per IS	Test Result	Requirements as per IS: 8112-2013
1	Standard Consistency	IS-4031 (Part -4) 1988(RA-2009)	28.50 %	-
2	a) Initial Setting Time	IS-4031 (Part -5) 1988(RA-2009)	160 Minutes	Not Less than 30 Minutes
	b) Final Setting Time	IS-4031 (Part -5) 1988(RA-2009)	475 Minutes	Not More than 600 Minutes
3	Soundness by Le Chartlier Method	IS-4031 (Part-3) 1988(RA-2009)	1 mm	Not more than 10mm

*Information is furnished by the Customer/Representative.

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VIDYARANI P.K.
Technical Manager



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Job No.: CTCE/BBMP/W.No.11/NK/CSR-11/993r/SAND-Gradation/2016-17

: 16.11.2015

TEST REPORT ON DETERMINATION GRADATION OF FINE AGGREGATES

* **Customer** : Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.

* **Agency** : Mr. N. Keerthi,
#66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.

* **Name of Work** : Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015

Technical Reference : IS : 2386 Part 1 - 1963 RA-2007

Sample ID : Fine Aggregates

Sample Received on : 14.11.2015

Date of Testing : 16.11.2015



Total Wt. of Aggregates in gms **1000**

Is Sieve Size in mm	Cumulative Weight Passing in %	Specific Limits as per IS 383-1970 (RA- 2007)			
		Zone-I	Zone-II	Zone-III	Zone-IV
10	100	100	100	100	100
4.75	96.50	90-100	90-100	90-100	95-100
2.36	80.20	60-95	75-100	85-100	95-100
1.18	58.40	30-70	55-90	75-100	90-100
600 Micron	28.20	15-34	35-59	60-79	80-100
300 Micron	15.30	5-20	8-30	12-40	15-50
150 Micron	6.10	0-10	0-10	0-10	0-15

* Information is furnished by the Customer/Representative

Remarks : This sample is under Zone-I specific limits.

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Job No.: CTCE/BBMP/W.No.11/NK/WMM/Gradation/2015-16

: 23.11.2015

GRADATION FOR WMM MORTH TABLE-400-11

Customer : Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : Mr. N. Keerthi,
#66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.

Name of Work : Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015

Date of Testing : 23.11.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): 5000



Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	150	150	3.0	97.0	95-100
22.4	1680	1830	36.6	63.4	60-80
11.2	785	2615	52.3	47.7	40-60
4.75	680	3295	65.9	34.1	25-40
2.36	625	3920	78.4	21.6	15-30
0.600	425	4345	86.9	13.1	8-22
0.075	350	4695	93.9	6.1	0-8

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Job No.: CTCE/BBMP/W.No.11/NK/WMM/Gradation/2015-16

: 23.11.2015

GRADATION FOR WMM MORTH TABLE-400-11

Customer : Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.

Agency : Mr. N. Keerthi,
#66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.

Name of Work : Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.

Reference : EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015

Date of Testing : 23.11.2015

Material : WMM

Sample Location : WMM Mix Plant

Oven Dry Wt (gm): 5000



Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	185	185	3.7	96.3	95-100
22.4	1595	1780	35.6	64.4	60-80
11.2	725	2505	50.1	49.9	40-60
4.75	635	3140	62.8	37.2	25-40
2.36	600	3740	74.8	25.2	15-30
0.600	685	4425	88.5	11.5	8-22
0.075	365	4790	95.8	4.2	0-8

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Job No.: CTCE/BBMP/W.No.11/NK/WMM/AIV/2015-16

23.11.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
Name of the Work	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	23.11.2015



Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	386	388	21.83
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	84	85	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	302	303	
4	Aggregate Impact value = percent fines	21.76	21.91	
	$100 * (W_2 / W_1) \%$			

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/W.No.11/NK/WMM/S-T/2015-16

23.11.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	Asst. Executive Engineer, Vidyananyapura Sub Division, BBMP, Bangalore.
Agency	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
Name of Work	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyananyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	23.11.2015



Result : Flakiness Index = **11.39%**

Elongation Index = **13.20%**

Result : Combined Flakiness & Elongation index 24.59%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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T-2377

Job No: CTCE/BBMP/W.No.11/NK/CSR-11/993r/SDBC(QB)/2015-16

09.12.2015

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
*AGENCY	:	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
*NAME OF THE WORK	:	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	07.12.2015
PERIOD OF TESTING	:	09.12.2015



The results of the tests conducted on the bitumen sample using for Semi Dense Bituminous Concrete.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	IS :1203 -1978 (RA-2009)	84	80 to 100
2	Softening point, °C	IS :1205 -1978 (RA-2009)	44	Min. 40
3	Ductility at 27°C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, °C	IS :1209 -1978 (RA-2009)	302	Min. 220

*Information is furnished by the Customer/Representative.



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Job No.: CTCE/BBMP/W.No.11/NK/SDBC/AIV/2015-16

09.12.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
Name of the Work	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	09.12.2015



Sl No.	Details	Trial No.		Average
		1	2	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	378	385	20.58
2	Weight of aggregate passing 2.36 mm sieve after the test = W_2 g	78	79	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	300	306	
4	Aggregate Impact value = percent fines $100 * (W_2/W_1)\%$	20.63	20.52	

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/W.No.11/NK/SDBC/Shape_T/2015-16

09.12.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	Asst. Executive Engineer, Vidyanayapura Sub Division, BBMP, Bangalore.
Agency	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
Name of Work	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyanayapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	09.12.2015



Result : Flakiness Index = 12.35%

Elongation Index = 13.92%

Result : Combined Flakiness & Elongation index

26.27%

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/W.No.11/NK/SDBC/Stripping/2015-16

10.12.2015

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
Name of the work	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	10.12.2015



Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.20	96.80
2	3.2		
3	3.3		



Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/W.No.11/NK/SDBC/Sp_Wa/2015-16

10.12.2015

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.
Agency	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
Name of the Work	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyanarayapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	10.12.2015



Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	$W_1 g$	2020	2021	2022	
2	Weight of basket suspended in water	$W_2 g$	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s g$	1270	1271	1272	
4	Weight of saturated surface dry aggregate in air	$W_3 g$	2012	2013	2014	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_s) g$	742	742	742	
6	Weight of oven dried aggregate	$W_4 g$	2000	2001	1997	
7	Specific Gravity	$W_4 / (W_3 - W_s)$	2.695	2.697	2.691	2.695
8	Apparent Specific gravity	$W_4 / (W_4 - W_s)$	2.740	2.741	2.754	2.745
9	Water Absorption	$((W_3 - W_4) * 100) / W_4$	0.60%	0.60%	0.85%	0.68%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/W.No.11/NK/SDBC/Bitumen/2015-16

10.12.2015

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IRC:SP:11-1984

CUSTOMER	Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.
AGENCY	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
NAME OF THE WORK	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyanarayapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
SAMPLE I/D	Roads in Kuvempunagara Ward No.11, BBMP, Bangalore.
DATE OF TESTING	10.12.2015



BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	474.5	474.5
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	25.5	25.50
7. Bitumen content in %	5.10	5.10
8. Average	5.10	

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Job No.: CTCE/BBMP/W.No.11/NK/SDBC/Bitumen/2015-16

10.12.2015

GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS2386 and IRC:SP:11-1984

CUSTOMER	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
AGENCY	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore - 64.
NAME OF THE WORK	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
SAMPLE I/D	Roads in Kuvempunagara Ward No.11, BBMP, Bangalore.
DATE OF TESTING	10.12.2015



GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cumulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	32.26	6.80	6.80	93.20	90-100
4.75	263.2	55.47	62.27	37.73	35-51
2.36	43.26	9.12	71.38	28.62	24-39
1.18	33.26	7.01	78.39	21.61	15-30
0.3	31.25	6.59	84.98	15.02	9-19
0.075	38.25	8.06	93.04	6.96	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cumulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	39.65	8.36	8.36	91.64	90-100
4.75	263.5	55.53	63.89	36.11	35-51
2.36	46.35	9.77	73.66	26.34	24-39
1.18	34.15	7.20	80.85	19.15	15-30
0.3	35.15	7.41	88.26	11.74	9-19
0.075	30.25	6.38	94.64	5.36	3-8

Note:

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Job No.: CTCE/BBMP/W.No.11/NK/SDBC/AGG/2015-16

10.12.2015

Aggregate Gradation Test

IS : 2386 Part I

Customer	Asst. Executive Engineer, Vidyaranyapura Sub Division, BBMP, Bangalore.
Agency	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
Name of the Work	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyaranyapura Sub Division, BBMP, Bangalore.
Reference	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	10.12.2015



Total Weight of Sample: **5600** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	430	7.7	7.68	92.32	90-100	
4.75	2930	52.3	60.00	40.00	35-51	
2.36	780	13.9	73.93	26.07	24-39	
1.18	465	8.3	82.23	17.77	15-30	
0.3	325	5.8	88.04	11.96	9-19	
0.075	325	5.8	93.84	6.16	3-8	

Total Weight of Sample: **5700** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade II MORTH specification
9.5	360	6.3	6.32	93.68	90-100	
4.75	3125	54.8	61.14	38.86	35-51	
2.36	685	12.0	73.16	26.84	24-39	
1.18	465	8.2	81.32	18.68	15-30	
0.3	325	5.7	87.02	12.98	9-19	
0.075	455	8.0	95.00	5.00	3-8	

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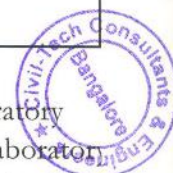
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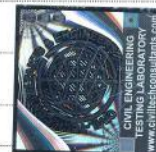


Job No.: CTCE/BBMP/W.No.11/NK/SDBC/Stability/2015-16

10.12.2015

TEST REPORT ON STABILITY OF MIX

Customer	:	Asst. Executive Engineer, Vidyanarayapura Sub Division, BBMP, Bangalore.
Agency	:	Mr. N. Keerthi, #66, Anandappa Building Hospital road, Yelahanka, Bangalore – 64.
Name of the Work	:	Road development and asphaltting works at Ashraya Layout residency roads in Ward No.11 (change of place to Singapura Layout Anjaneya temple surrounding in Ward No.11), Vidyanarayapura Sub Division, BBMP, Bangalore.
Reference	:	EE/BTP/BBMP/E-PMT/11(16945)WO/63/2015-16 Dated: 29.04.2015
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Semi Dense Bituminous Concrete
Date of Testing	:	10.12.2015



The results of the tests conducted on the Semi Dense Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-16)
1	Marshal Stability, Kn	8.65	8.75	8.2 Kn (min)
2	Marshal flow, mm	2.85	3.15	2 – 4
3	Percent air voids in Mineral Aggregate	3.05	4.10	3 – 5
4	Voids in Compacted Mix	13.65	13.90	13 – 15
5	Percent Voids filled with Bitumen	66.60	67.25	65 - 78
6	Density, g/cc	2.27	2.28	--

Note:

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